ICDF 60% DESIGN PACKAGE[a]
DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: 60% ICDF RD Comments – (General)

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
1	General		There is no explanation provided in the text why a different model (STOMP) has been adopted for the 60 % Phase Fate and Transport Modeling than had been used previously (Martian 2000) for the ICDF project. Suggestion: The text should explain why the author considered it necessary to use a different model at this point in the ICDF project. The text should also include a comparison of both models and a description of what enhancement to predictive accuracies the new model presents. (JR)	The modeling effort used the STOMP version 2.0 (Subsurface Transport Over Multiple Phases) finite difference code developed by Pacific Northwest National Laboratory (PNNL) to conduct the simulations. This code was selected for use due to its streamlined set-up, rapid calculation speed, and comparability with previous modeling results. Notably, rapid calculation speed for simulating contaminant transport is essential for the modeling process due to the large number of simulations that are needed for establishing waste acceptance criteria (WAC). As part of model set-up and calibration, simulations were performed using STOMP to compare against previous TETRAD modeling results. Acceptable agreement was found between the two models. These comparison runs will be presented and described in the 90% design submittal.
2	General		Both models clearly indicate a high sensitivity of contaminant migration rates to maintaining an infiltration rate 0.0001 m/yr. The recent modeling further suggests that an increase in infiltration to as low as 0.0005 m/yr will result in unacceptable COC concentrations in the SRPA. The values assigned to hydrologic input parameters that affect infiltration rates have not been verified thorough site specific testing but were developed matching characteristic curves. Parameters such as the saturated moisture content and vertical conductivity of basalt and interbed layers should be verified with site specific data to assure the validity of the assumed values. Suggestion: The potential variation between assumed values and those actually existing at the site, considering the high degree of sensitivity of the infiltration rate, should be further examined. (JR)	Model hydrologic parameters were developed from existing measured data where and when possible, otherwise estimated values were used as input. The estimated values were selected on the basis of historical precedence and usage (e.g. Magnuson, 1995, Schafer et al. 1997, or Martian, 2000) or model conservatism (with respect to maximizing the peak concentration). The reports by Magnuson (1995) and Schafer et al. (1997) in particular provide substantial explanation for the development of the hydrologic property estimates, both evaluated and estimated. It is not certain what additional testing and analysis would gain because the inverse calibration was able to mimic the gross or general behavior of the natural flow regime with the (then) existing data. It should also be noted that the infiltration rates simulated in the fate and transport modeling (e.g. 0.0001 versus 0.0005 m/yr) were prescribed fluxes at the model top boundary, and thus independent of any units' hydrologic properties. In regards to maintaining an infiltration through the cover, the parameters used in the hydrologic modeling of the final cover are considered to be minimum values that will be used to identify acceptable sources prior to cover construction.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: 60% ICDF RD Comments – (General)				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
3	General		These modeling results indicate that the transport of contaminants of concern to the Snake River Plain Aquifer will be dependant on limiting infiltration rates to 0.0001 m/yr. Considering the half life of several of the contaminants, for example Iodine-129 and Technecium-99, maintaining the integrity of the landfill cover will be critical over extended time periods. Suggestion: Additional information should be provided along with the details on materials and design features that will be incorporated into the landfill to insure that the protection of the cover over extended time periods. (JR)	Details on materials and design features that are incorporated into the landfill that insure protection of the cover are described in the 90% Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation. A summary of these features are provided below: • **Large Diameter Sideslope Rock Armor:** The cover will be armored on its sideslopes with large (up to 2 foot diameter rock) basalt riprap sized to prevent water and wind erosion from eroding the sides of the cover. The riprap was sized to prevent erosion due to the probable maximum precipitation event (i.e., 1 in 1,000 year event) using NRC design criteria for long-term stabilization. • **Soil/Gravel Surface Mulch:** Wind tunnel studies have demonstrated that the soil and pea sized gravel mulch protecting the cover surface is resistant to sustained wind speeds of above 60 mph. The average wind speed at INEEL is 9 mph. • **Overbuilt Cover Thickness:** The cover includes an extra 4 feet (45% increase in thickness) of soil that if eroded would continue to reduce infiltration to 0.0001 m/year. • **Biointrusion Rock Armor:** Extensive studies at INEEL demonstrate that the biointrusion rock in the cover will prevent insects and animals from penetrating the cover. Additionally, defects left in the upper portion of the cover (above the biointrusion layer) by animals have been accounted for in the cover design. • **Earthen Materials:** The cover systems will consist of earthen materials engineered to perform a specific function in the ICDF that are products of chemical and physical degradation processes over geologic time (millions of years). The 90% Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation addresses these natural degradation processes and how they are accounted for once they are part of the cover systems.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: 60% ICDF RD Comments – (General)

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
4	General		Contaminant transport modeling was performed to develop Waste Acceptance Criteria for soil contaminant concentrations by ICDF. The modeling indicates that in order to achieve sufficient contaminant retention time, infiltration through the landfill cover must be limited to 0.0001 m/yr to prevent COC concentrations above MCL in the Snake River Plain Aquifer. The Waste Acceptance Criteria as proposed assumes that the cover can be maintained for a time period in excess of 1000 years. The basis for this assumption is unclear?	See response to comment number 3.
5	General		The text does not include discussion of how the cover infiltration rate will be verified and monitored after construction is completed and monitored over time and should.	The leachate collection and recovery system will be monitored for the 30-year post closure period. Leachate generation is expected to reach an equilibrium rate of less than 700 gallons per year. A higher leachate generation rate would suggest a larger infiltration rate through the cover.
6	General		The assumption that the design and maintenance of the cover will allow it to perform successfully over a time period exceeding 1000 years is difficult to substantiate. The effects of reconfiguring, thinning, and possible removal of portions of the engineered earth cover due to the effects of aeolian erosion over a time period exceeding 1000 years are of concern as the modeling predicts impact to the SRPA at even slightly higher infiltration rates. Loss of cover material will adversely affect the ability of the cover to limit the infiltration rate and result in increase contaminant concentrations in the SRPA. <u>Suggestion</u>: Additional discussion is needed that identifies the long term O&M requirements and periodic testing and maintenance of the ICDF cover to insure the predicted performance of the cover. (JR)	See response to comment number 3.

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DOCUMENT TITLE: 60% ICDF RD Comments – (General)				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
7	General		Perched water monitoring should be a component of the groundwater monitoring strategy. <u>Suggestion</u>: The proposed Groundwater Monitoring DQO Objectives should include monitoring of perched aquifer water quality between the top of the basalt and the surface of the SRPA. Although the ICDF Percolation Ponds are currently a source of infiltration removing the ponds from service will take time to dry the perched aquifers. Therefore, the perched aquifers will continue to contribute contaminants to the SRPA and may confuse ICDF groundwater monitoring results. (JR)	Groundwater monitoring is an important component of the ICDF monitoring strategy and towards that, DOE has supported the installation of a tertiary monitoring system beneath the landfill (not required by regulations) as well as new RCRA-compliant monitoring wells in the SRPA. Given the fact that one of the Remedial Action Objective for the OU 3-13 ROD is to dry up the perched water bodies, it does not seem technically prudent to monitor a water body that is man-made and will not be present in the timeframe when needed. This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.
8	General		Data is necessary, characterizing the vadose zone to define the current perched water qualities and gradients and distinguish their impact on groundwater quality of SRPAis needed for comparison to activities at ICDF.	The Groundwater Monitoring Plan, to be provided with the 90% submittal, will provide the available data concerning the perched groundwater at the ICDF.
9	General		The calculation of the soil contaminant concentrations used in the ecological risk assessment needs to be verified. It appears as if an error in the calculation of the soil contaminant concentrations may have increased the contaminant concentrations by three orders of magnitude.	The calculation has been verified. A more detailed explanation of how the calculation was derived and what soil density was used has been added to the document.
10	General		The CAPP-88 outputs used for the NESHAP Modeling need to be provided in the 90% design document for review purposes.	CAP-88 results were supplied by e-mail. They will be attached as an appendix to the document.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-275, Fate and Transport Modeling Results and Summary Report

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
11	Sec 2.1, 5th para	2	The text is confusing where it states that as a result of increasing the landfill footprint that "Therefore, the contaminant transport portion of the modeling increased by the specified recharge rates by a factor of 1.77." Suggestion: Please include additional information to clarify the statement regarding how an increase in area of the landfill footprint was used to specify recharge rates. (JR)	The area of the waste at the surface is 1.77 times the area of the waste at the bottom. Therefore this factor takes into account the larger capture area of infiltration at the surface of the waste pile. The 60% text will clarify this factor. The text will be revised to indicate the total recharge increases, not the rate.
12	Sec 2.1, 3rd para	2-5	The use of the van Genuchen equations referenced in the model to describe moisture retention on porous media were developed to estimate moisture in interstitial pore space. Fluid flow thorough fractured basalt is generally assumed to be primarily through the open fractures and to a limited degree through weathered surfaces and sediment filled fractures. These factors could impact estimates of moisture retention characteristics of the vadose zone. (JR)	One of the conclusions of the inverse calibration of Magnuson (1995) was that the dual porosity model, which included a mathematical continuum to represent the fracture domain, did not improve the match of the model output to the calibration targets significantly enough to warrant the additional computational burden. The van Genuchten parameters used to simulate the basalt moisture retention characteristics were developed to match the Brooks-Corey parameters cited by Magnuson (1995), Schafer et al. (1997), and Martian (2000). An exact match between the moisture retention models was not possible, but the model results indicated similar moisture retention behavior. The moisture profiles through the model domain using the van Genuchten moisture retention model for the basalt layers indicated very small values (< 0.0001) of volumetric moisture content occurring in those layers. The very small moisture content values indicate that almost all moisture entering the basalt layers drains rapidly through the basalt, with virtually no capillary retention.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-275, Fate and Transport Modeling Results and Summary Report

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
13	Sec 2.1, 3rd para		The text should reference the application of these equations in the description of groundwater and contaminant transport through unsaturated and fractured basalt to support their use as appropriate. Although the text references an INNEL report, Schafer et al, 1997, the text should include mention results of data or testing of the basalt that support the accuracy of the predictions made in the Schafer report. The EDF-275 should also include any references from formal hydrogeologic or mathematical literature that describe the application of these equations to fluid movement through fractured basalt. (JR)	See the response to Item #12. Also, dual porosity models that account for fracture flow require data that are highly empirical and difficult to collect (e.g. a matrix-fracture interaction term, a characteristic fracture aperture term, a characteristic distance between fractures, etc.) and would have to be estimated. Instead, the van Genuchten moisture retention model appears capable of providing an adequate representation of fracture flow for this domain.
14	Sec 2	2-6	The text states that "Synthetic materials that are part of the liner design were not included in the model stratigraphy, although they are expected to remain effective for thousands of years." The assumption that plastic polymer membranes will remain effective for thousands of years cannot be substantiated and the text should be amended to reflect this. (JR)	Will delete the subjective statement on longevity in the revised 60% deliverable.
15	Table 2-3	2-7	The contaminant transport properties listed in Table 2-3 include values for bulk density and vertical conductivity that may not accurately reflect the properties of the interbed materials across the site. The properties of the interbed materials are likely to vary locally in composition, grain size, thickness and may in some cases be absent altogether. The text should reference any sampling and testing reports that corroborate that the assumed values are representative of the interbed characteristics in the footprint and downgradient of the ICDF landfill. (JR)	See response to items 2 and 12.
16	Sec 4, 4th bullet	4-1	The text recommends that Tier 2 activities incorporate simulation of the removal of leachate from the landfill and evaluate the impact on estimated groundwater concentrations of the leachate constituents. The author should mention in the text the ultimate disposal location for the sludge residues remaining in the leachate evaporation ponds after landfill closure. (JR)	It is the intent of the design to place sludge residues from the evaporation ponds into the ICDF landfill before landfill closure. Sediments will be dewatered and tested for meeting disposal criteria for the landfill. The sediments would be treated at the SSSTF prior to disposal if necessary. This text will be added to the 60% document.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10865, Waste Acceptance Criteria for ICDF Landfill

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
17	Sec 1, last para	1-1	It is not clear the significance of the SSSTF activities taking place within the AOC defined in the OU 3-13 ROD? Whether LDR requirements are triggered depends on the specific circumstances	The significance of the SSSTF being within the AOC is that waste can be moved from SSSTF to landfill or EP without triggering LDRs.
18	Table 1	4-5	The compound RDX is included in this table along with a footnote stating that no design inventory has been identified for RDX, and that a 1.0 mg/kg concentration has been assumed. Given that UXO with RDX may be periodically discovered in the WAG 10-04 soils, a discussion is needed on the selection of 1.0mg/kg concentration used for simulation purposes.	Footnote will clarify where the 1.0 mg/kg concentration value came from, i.e., Appendix C of the Comprehensive RI/FS for WAGs 6&10 OU 10-04, DOE/ID-10807, Rev. 1, August 2001 indicates there were 28 sites analyzed for RDX. The average RDX concentrations from each site were summed and then the average of those were calculated to determine the 1.0 mg/kg concentration assumption..
19	Sec 5.3.1, 1st para	5-8	The text that "....wastes not currently in the inventory will be discovered...." and "...this WAC will be developed using the same process...". It is likely that additional contaminants will be discovered at concentrations that exceed those that were assumed for the modeling. A logic tree is needed to evaluate additional WAC constituents. Also, needed is a discussion on how and when the ongoing inventory of radionuclides already accepted and disposed of in the ICDF will be reviewed, evaluated and reported to the agencies for review.	Section 4.2.1 outlines the procedure to evaluate any new waste that is not in the inventory. The same process will be used for the "new waste" to determine if it would cause a n issue wit the groundwater. A logic Tree is provided in Section 4.2.1. The tracking software will a routine built into the program to calculate the rad concentrations when the profiles are entered. If the profile causes the rad content limits to be exceeded, an alarm is sent out and the profile is not accepted.
42	WAC ICDF		There are two different pages numbered as "5-2". Please correct. (JF)	Can't find, need more explanation. Please provide fax of both sheets so we can correct the error.
63**	Table 4-1	4-1	The statement about the permeable reactive barrier (PRB) should be qualified to "after landfill closure". The landfill cap will not provide any protection to human health and the environment prior to completion. How does *not* having a PRB affect the decision logic of the WAC? The logic should proceed with protection of the PRB via the WAC, if the PRB were to be installed. (RH)	However, prior to the completion of the cover, the leachate collection system will be used to prevent migration into the subsurface. The F&T modeling, in conjunction with the I-129 limit in the WAC do not include the PRB and do not exceed the Groundwater protection requirement. Therefore, there is not an effect from the PRB not being included in the design.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10865, Waste Acceptance Criteria for ICDF Landfill

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
64**	Sec 5.1.6 & 7	5-2	While not specifically stated in §5.1.6, gas disposal is effectively prohibited due to the restrictions. Why then accept any gas containers that are pressurized? Pressurized gas containers are subject to container structural collapse leading to landfill subsidence. Concerns have been raised previously during the 30% design review meetings about landfill subsidence. (RH)	Gas cylinders will be accepted into the facility only after they have been grouted for void space concerns or cut open. Clarification will be added to the text.
65	Sec 5.2.6	5-7	Please explain with operational details how the WAC gas generation is to be limited to 1.5 atmospheres if this requirement remains a valid criteria. (RH)	The 1.5 a atmospheres is a requirement for the disposal of canisters. The 90 % WAC will develop limitations on how to restrict landfill gas generation from decaying material. .
66	Table 5-3	5-8	If the ICDF design assumption is based upon the boxes being filled, then the requirement should be stated as, "...boxes will be completely filled with waste, or other inert material to achieve zero void space." (RH) <u>Suggestion</u>: As some settlement of the contents is anticipated during handling, the 5% void space should be a "not-to-exceed" criterion.	We agree that our goal should be to fill every container completely and that the 5% void space should be a not to exceed criterion. The text will be revised to reflect this approach.
67	Table 5-3	5-8	Steel plates in a size up 4 feet by 20 feet will be allowed into the landfill. This size appears to be excessive when compared to other landfill operating statements that waste placement and operations are to be designed to limit settlement and subsidence. This large size steel plate provides a good foundation for additional waste, but potentially allows for void space to be constructed into the waste fill under the plate. (RH)	Agreed. We will reduce the recommended allowable size of steel plates from 4' x 20' to 4' x 8'. With a plate of this smaller size, landfill equipment can be used to minimize any voids underneath the plate.
68	Sec 5.4.6	5-31	To minimize subsidence, waste will be compacted to a minimum of 20 psi. Does this mean a minimum compactive effort of 20 psi shall be applied to the waste placement when filling a container? (RH)	The text will be clarified to read as follows: "The wastes within containers will be placed and tamped in layers or stabilized to create a waste mass that minimizes settlement."
69	Sec 5.4.6	5-31	Waste shall fill at least 95% of the container does not comply with the section heading to minimize subsidence. Containers should be completely filled with waste, or other inert material to minimize subsidence. (RH)	Text will be revised to reflect response to comment 66.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-279, Hydrologic Modeling of Final Cover

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
20	Sec 3.3.1, 1st para	3-3	The text states that "The surface of the upper section will also provide erosion protection and promote surface runoff." The fine-grained characteristic of the soil proposed for this layer will promote runoff and moisture retention as previously noted in the text. However, the fine-grained soil will be subject to, and not provide protection from, erosion. The text should be amended to remove the mention of this layer as providing protection from erosion. (JR)	This sentence "The surface of the upper section will also provide erosion protection and promote surface runoff" will be deleted in the revised 60% percent submittal. For clarification, the design of the surface erosion protection is provided in the Liner and Final Cover Long-Term Performance Evaluation and Final Cover Life Cycle Expectation submitted with the 90% design package.
21	Sec 5.1, 2nd para	5-1	This section of the text discusses the most recent modeling runs conducted to assess the sensitivity of infiltration to the thickness of the landfill cover. The modeling, as is noted in the text shows, no significant increase in storage capacity of the cover with increased thickness of the cover. The text goes on to recommend a minimum cover thickness of 2 meters and then states " Additional material may be required to address erosion and aeolian effects." The text should include results and discussion of the modeling results when the cover is less than 2 meters thick. In addition, the statement regarding additional material should be clear that there will be requirements to maintain the cover in order to assure the design infiltration rate. (JR)	The silt loam layer of the covers modeled ranged from 0.25 to 3.5 m. The results of these runs are shown in Figure E-1 provided in Appendix E of the Hydrogeologic Modeling of Final Cover study. We will include a discussion of the results when the cover thickness is less than 2 meters thick in the revised 60% submittal.
22	Sec 6, Figure 6-1		The modeling scenarios use Point D as the location to predict water storage breakthrough of the cover. Point D as shown in this diagram, at the apex of the slope of the landfill cover, is not the location that would be expected to develop the maximum hydraulic head. The side slope area near Point C would have combined effects of infiltration runoff and of saturation moving laterally in the soil subsurface which would increase with the distance traveled downslope. (JR)	Point D shown on Figure 6-1 represents water storage breakthrough in units of mm/year over the entire cover area, which includes the apex and side slope area.
23	Sec 6, Figure 6-1		The text should include discussion of why Point D was selected and whether the modeling results will be affected by moving the breakthrough point downslope in the vicinity of Point C. (JR)	We will include a discussion and clarification that point D actually represents the entire cover area. A discussion on the difference between the infiltration at the apex and sideslope will be added to the revised 60% submittal.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-279, Hydrologic Modeling of Final Cover

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
80	Sec 3.1, 4th para	3-2	The intent of the analysis is to demonstrate the ability of the landfill cap to withstand potential changes in climate and environment over the 1,000 year design life. The perceived advantage of short duration storms requires analysis to determine how sensitive the cap is to changes in climate. (RH)	The text is relying on the readers intuition that shorter, high intensity storm events create more runoff and less infiltration. Evapotranspiration covers are less effective when exposed to long duration, low intensity storm events. Therefore, the 12-hour storm duration was selected to be conservative.
81**	Sec 3.2, 2nd para	3-3	The selection of a poor stand of grass along with the SCS run-off curve number of 79 tends to increase the amount of water run-off from the landfill cap. These assumptions maybe realistic, but the range of alternatives should be modeled since this is a constructed facility to design specifications. What happens if the grass stand is good and more infiltration occurs? (RH)	A good stand of grass would reduce the amount of runoff but would also increase the amount of water removed from the cover by transpiration.
82**	Sec 3.3.2, 1st para	3-5	The larger the difference in hydraulic conductivity, the better performance a drainage layer will have. The assumption that sands will have a minimum hydraulic conductivity of 1×10^{-2} cm/sec is optimistic. This is a highly processed sand with unique qualities. A more realistic value is sand with a minimum hydraulic conductivity of 1×10^{-3} cm/sec, or even 1×10^{-4} cm/sec for the sands native to the ICDF area. (RH and WF)	The sentence "... minimum hydraulic conductivity of 1×10^{-2} cm/sec..." should be maximum hydraulic conductivity of 1×10^{-2} cm/sec. A saturated hydraulic conductivity of 1×10^{-3} cm/sec will be specified for the sand layer.
83**	Sec 4.3, 2nd para	4-3	Based upon the analysis presented, it appears that changing the assumption for the drainage area will not make much difference. A better assumption generating the most runoff into the burrow hole would result from a hole located at the top of slope allowing for runoff from half the cap length and maybe 1 meter wide to enter the hole. (RH)	We agreed at the June 18 meeting in Boise that the drainage area would be 10 times the diameter of the hole. This is the evaluation that is provided in the document.
84	Table 6-1	6-1	The column headings are missing appropriate adjectives, such as "average" and "maximum". (RH)	The column headings should be "base case" and "extreme case". The table will be corrected in the revised 60 percent submittal.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
24	App. C, GW Monit DQO Sec C-3.1.1 PSQ	C-4	The principal study question is stated as "Has the operation of the ICDF landfill resulted in the release of contaminants into the environment beneath the landfill that could exceed RAOs in the SRPA?" It will be difficult to make this determination without including ground water data from the perched aquifers	Groundwater monitoring is an important component of the ICDF monitoring strategy and towards that, DOE has supported the installation of a tertiary monitoring system beneath the landfill (not required by regulations) as well as new RCRA-compliant monitoring wells in the SRPA. Given the fact that one of the Remedial Action Objective for the OU 3-13 ROD is to dry up the perched water bodies, it does not seem technically prudent to monitor a water body that is man-made and will not be present in the timeframe when needed. This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.
25	App. C, GW Monit DQO Sec C-3.1.1 PSQ	C-4	The current plan will identify releases directly below the landfill, but unless all such releases are considered a threat to SRPA, potential impact to SRPA water quality cannot be assessed. Without existing data on gradients and water qualities, the impact on the perched aquifers that a release would migrate to first and mix with cannot be measured. Without data to assess the effect on the perched aquifers an accurate prediction of the ICDF impact on the SRPA will not be possible. (JR)	See response to comment number 24.
26	App. C, GW Monit DQO Sec C-4. 4th Input to Decision	C-5	The text states that groundwater sampling in the SRPA will be conducted to "...identify statistically significant evidence of contamination from the ICDF landfill." Please provide additional explanation in the text of how this determination will be made. As the ICDF will accept contaminated soils from the Chem Plant which is already suspected of impacting the water quality of the SRPA, it is not clear how additional degradation of groundwater quality will be attributable to the ICDF since they will have the same contaminants of concern. (JR)	Language will be added to the text in the 90% design document (ICDF Groundwater Monitoring Plan) to outline the specific statistical test (Student T test). In order for any increase to be determined as a leak from the ICDF Complex, the test will have to include some verification from the Complex itself. The tertiary system will detect any leak long before the release would reach the groundwater. If a release is based solely on groundwater sampling, the upgradient well data could not show an increase or trend which would indicate a separate source from the ICDF complex. A "statistically significant detection" will trigger confirmation sampling to verify that the data are correct.

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DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
27**	App. C, GW Monit DQO Sec C-5. 3rd para	C-5	The text states that "The groundwater monitoring program will continue at a minimum throughout the active life of the ICDF and through the ICDF closure period." The text further provides an estimate based on a 15 year active and 30 year post closure period that would extend to the year 2048. Considering the longevity of several COCs and the projected travel time to reach SRPA the groundwater monitoring program will need to extend well beyond the year 2048. (JR)	Comment will be addressed in the ICDF Groundwater Monitoring Plan to be submitted with the draft ICDF RD/RA Work Plan.
28	Attach 1, Vadose Zone Monit, Leak Det. System Sec 4.2, 1st para	C-1-5-3	The proposed limited extent leak detection system (LDS) and its orientation along the short axis of the landfill as depicted in Figure I-1 results in a significant area outside the monitoring area. The text should discuss the anticipated life of the geomembrane material and determine its functionality after the material deteriorates. (JR)	The secondary leak detection recovery system (SLDRS) was strategically located to provide early detection of leaks through the ICDF liner system. Leaks will be detected in areas where the maximum leachate head will occur. These locations include the center drain and sump since the bottom of the landfill floor is sloped to direct leachate to these areas. The design life of the geomembrane will be 45 years. The highest probability for leaks to occur is during the operations life cycle when leachate generation will be the greatest and waste is being placed into the landfill. After 45 years, leachate generation will be minimal due to the cover and the SLDRS will no longer be needed.
29	Attach 1, Vadose Zone Monit, Leak Det. System Sec 4.2, 1st para	C-1-5-3	Consideration should be given to the value of adding stainless steel suction cup lysimeters at both ends or midway between the limited LDS and the ends of the landfill to supplement the proposed LDS. (JR)	Since the vadose zone monitoring system is located beneath the area of the landfill where leachate is collected and conveyed it is monitoring the area of the landfill that has the highest leakage potential. As such, it is likely that the monitoring system will identify the source of leakage from the facility within this zone of highest leak risk. Additional monitoring with suction lysimeters in areas with low probability of leachate migration is not considered technically justified.
30	Attach 1, VZ Monit Figure C-1		The proposed monitoring locations for the SRPA monitoring wells shown in Figure C-1 and discussed in Section C-8, may not provide sufficient data to insure accurate evaluation of ICDF activities on the groundwater quality of SRPA. (JR)	This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
31	Attach 1, VZ Monit Fig C		The proposed down gradient monitoring well locations of USGS-112, and in particular USGS-113, do not appear to be in optimal down gradient locations as they are too far to the east of the ICDF. Groundwater flow contour data should be included in this figure to substantiate the ability of these wells to intercept potential contaminant releases from the ICDF. (JR)	This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.
32	Attach 1, VZ Monit Fig C		The distance of two of the wells, at several thousand feet from the ICDF, are too far from the landfill to detect low concentrations of potential contaminants in the aquifer within a reasonable time frame. Also, the location of USGS-57, while required to assess potential impact close to the footprint of the landfill, may be too close if the lateral migration of contaminants across interbed materials results contamination entering the aquifer some at some point down or side gradient of the landfill boundary. <u>Suggestion</u>: The proposed monitoring well location may need to be revised to provide an adequate monitoring network for the ICDF. (JR)	This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.
33**	Attach 1, VZ Monit Fig C		The proposed monitoring wells are all USGS installations which typically are constructed with long open bore hole configurations. The wells shown in Figure C-1, for example, have intervals open to the basalt formation that range from 119 to 225 feet in length. This design incorporates groundwater flow from many different horizons within the aquifer and will provide a blended water quality from multiple flow zones. This well design is not typically an acceptable configuration for groundwater monitoring wells due to the poor quality of groundwater data that they produce. (JR)	This comment will be addressed in the 90% submittal since it includes the ICDF Groundwater Monitoring Plan.
34	ICDF- Mstr Tbl of Docs, App A Sheet 2 of 2		Cleanout risers are typically installed one per cell. If the pipes are separated, they would allow for easier detection of a leak. However, if the two pipes will be connected as shown on Sheet 2 of 2, it should be designed with a cleanout access capable of reaching all parts of the system with standard pipe cleaning equipment. (JF)	Clean-out access to the collection pipe is provided from both the north and south ends of the collection pipe and cleanout access will reach all parts of the system. This access will be clarified in the 90% design submittal.

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DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
35	ICDF- Mstr Tbl of Docs, App B Sec 1.1	B-5	Description number 8 states that sediments that accumulate in the evaporation ponds will be sprayed using a nearby raw water hose to move the sediments to the sump area. However, a sump is not included in the design of the evaporation pond. Please explain. (JF)	There is a low point in the northeast and northwest corners of the West and East Evaporation Ponds, respectively. This low area is termed the sump area of the ponds. This low point will serve to collect sediments that are sprayed to the low point using the raw water hose bibs located adjacent to the ponds. Note also that there is a leak detection sump located just below this pond surface low point as well. This will be clarified in the text of the 60% submittal, and shown in the 90% design.
53	App A, Dwg C-303, Detail 5		The detail illustrates a stepped connection of the new compacted clay liner with the existing clay. Vertical cuts do not allow for adequate kneading of the clay during construction which will provide for an integral clay layer bond between the new and existing clay. <u>Suggestion</u>: A better suggestion is to back cut the clay on a slope allowing for the compaction equipment to operate on both the new and existing clay, kneading the two zones together into an integral layer. (RH and WF)	A sloped connection will be shown at the Cell 1/Cell 2 clay liner interface for the 60% and 90% design.
54**	Sec 1.1, Items 2 & 3	B-4	The focus of the contamination appears to rest on TSS for the decision to direct the liquid waste to the ICDF evaporation pond. As the design inventory will become an operational limitation, other CERCLA waste constituents should be addressed, e.g., organic solvents.	The constituents identified in the WAC will be addressed as part of the waste profile analysis prior to acceptance of wastes. This requirement was intended to be a visual observation to ensure loads with significant sediment are discharged to the SSSTF Decon Building to remove the sediment.
55	Sec C-4, Items 3 & 4	C-5	How are these objectives to be accomplished given the fact that the vadose zone is several hundred feet thick and contains some significant gravel layers? (RH)	This issue will be addressed in the 90% submittal.
56	Sec 4.1, 2nd para	C-1-5	The neutron scattering method is being described as a soil moisture monitoring method. How will landfill leakage contributing to groundwater contamination which contain radionuclides interfere with the proposal to use the neutron scattering method? (RH)	Neutron logging of soil moisture is not proposed for the vadose zone monitoring program. It was identified and discussed as a potential option, but discounted due to its limitations such as reading moisture only with no quantification of moisture constituents. Both suction cup and pan lysimeters were identified as having potential to accomplish moisture identification, quantification and sampling, and were carried forward for detailed analysis in the plan.

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DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
57**	Sec 4-1, Last para	C-1-5	This discussion about potential natural increases in soil moisture appears to be a catch all to indicate that any detectable increases in soil moisture will probably be the result from sources other than the landfill. The stated reasons are probable, but placing an impermeable layer that prevents natural groundwater recharge must also figure into the analysis. Increases in soil moisture should first be assumed to originate from the landfill. (RH)	A vadose zone monitoring program that allows for moisture detection and capture is recommended. This then allows for quantification of constituents in the captured moisture for comparison against the ICDF leachate signature.
58	Sec 4-2, 1st para	C-1-5	Several states require leak detection systems as part of the landfill design and the landfill operators can successfully compete on economical terms with landfills that do not have such systems. It appears from the text that the authors have determined a leak detection system is not economical without justification. (RH)	We are not aware of states that require tertiary leak detection systems as part of regulatory approval for liner systems and request clarification of this point. However, a second leak detection system can be used cost-effectively (as a substitute for more costly systems such as the perched zone monitoring system) if focused on where leachate leaks have the highest impact and probability of occurrence.
59	Sec 5, 2nd para	C-1-8	The use of drain sands can be improved upon for this application. The problem with the use of sands is that the void space will have a moisture retention capacity and liquid flow must overcome the capillary attraction created by the sand particles. The installation of a geocomposite drainage media allows for minimal moisture retention when dealing with small flows and allows for faster transmission time to the sample extraction location. (RH)	The use of sand in this application was to provide a stable compaction surface for the overlying compacted clay liner. There was concern about damage to a geocomposite placed directly under the CCL during construction of the GCL.
60**	Sec 5, 2nd para	C-1-8	The proposed tertiary leak detection system is only 22 feet wide (corresponding to the roll width of HDPE liner) and is located under the lowest longitudinal location of the landfill liner. This proposal does offer a very good economical suggestion for groundwater collection from the vadose zone under the liner with the highest risk of leaking. The proposal to place only 22 feet of HDPE under the landfill as a proactive method of collecting landfill leakage does not address the balance of the landfill area, other than to rely on traditional groundwater interception at a monitoring well. (RH)	Agreed. However, these other landfill areas have lower leakage risk due to the very small head anticipated for leachate traveling over the liner systems in these areas.
61	Sec 5	C-1-8	A tertiary leak detection system is proposed for the landfill liner. What is the reasoning that a similar system is not required for the ICDF evaporation ponds? (RH)	The evaporation ponds will be monitored for leakage and its liner systems can be repaired if unacceptable leakage rates were to be detected.

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DOCUMENT TITLE: DOE/ID-10925, Master Table of Documents

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
62	App D, Fig 1-2	C-1-5	Please include a geotextile, or preferably a geocomposite layer between the drain sand and the drain gravel forming the sump area for the tertiary leak detection system. The drain sand must be separated from the drain gravel. The logic for the geocomposite was presented above in the comment for Page C-1-8, §5, 2nd ¶. (RH)	A separation geotextile is shown between the drain sand and drain gravel layer in the tertiary leak detection system in the East-West cross-section of Figure I-2.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-311, Screening Level Ecological Risk Assessment				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
36	Sec 1.1.1	6	The explanation of the soil exposure point concentration calculation is not accurate as it does not include use of a density for the landfill material. Since the landfill material density (kg per cubic meter) is not provided, the soil exposure point concentration calculations cannot be verified. It appears from using the presented maximum contaminant mass and the presented contaminant mg/kg that either the landfill material (contaminated soil) density used in the document is 1.5 kg/m^3 or the density is 1500 kg/m^3 and there was an error in units conversion. The 1500 kg/m^3 density of landfill material is consistent with what would be expected for contaminated soil. The description of how the soil contaminant concentrations are calculated needs to be enhanced to clarify the equation used. (JS)	The value for soil density and how it was used has been added to the explanation of the soil contaminant concentrations.
37	Sec 1.1.1	6	This section of the ecological risk assessment describes how the surface water concentrations in the evaporation ponds were calculated. The document states that "no organics were identified as concerns for the leachate in EDF-ER-274." This statement is not adequately supported in the ecological risk assessment. Additional information should be provided in the 90% design document. (JS)	Consultation with the project and information from EDF-ER-274 confirm that no organics are present in the leachate. Last sentence of the original response needs deleted.
38	Sec 2.1.1	36	This section presents the exposure modeling to calculate the non-radionuclide dose to functional groups. The text states that water ingestion from the evaporation ponds is included in the exposure evaluation. The estimated exposure from water ingestion is not explicitly included. Although, the definition of the exposure variable is specified as being from all complete exposure pathways, water consumption and water contaminant concentration variables are not part of the exposure equation. The presentation of the equations should be revised in the 90% design document. (JS)	Water ingestion is generally not an issue at the INEEL (INEEL-95/0190). Water ingestion was included in the HQ analysis and not in the development of EBSLs. This will be clarified in the text.

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DOCUMENT TITLE: EDF-ER-311, Screening Level Ecological Risk Assessment

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
39	Sec 2.3.1	41	This section describes the diet parameter input values. The percent prey and the percent vegetation are described as one minus the percent soil. This text description on page 41 is not consistent with the parameter defaults presented in Table 10 on page 38. Also, the text on page 41 specifies that percent soil values were taken from Beyer 1994. The document does not specify the assumptions used when values were not available in Beyer 1994. For example, it does not specify whether the percent soil is assumed to be 2% of the food ingestion rate for burrowing mammals and birds that consume whole terrestrial prey. The discussion of uncertainty with the soil ingestion values on page 45 describes other literature sources used for these data in addition to Beyer 1994. The discussion on page 41 would be enhanced if: it were consistent with Table 10, included a list of literature sources used to obtain percent soil values; and included a discussion of assumptions used when literature values were not available. (JS)	A clarification will be made as suggested. The text on page 42 was clarified to indicate that functional grouping making it consistent with Tables 9 & 10. For screening purposes the most conservative assumptions were made concerning exposure. A column was added to Table 9 presenting the PS model species and sources for other information.
40	Fig 7	53	This figure presents the ICDF landfill ecological risk soil screening process. The second step in the figure is not consistent with the text and screening tables. Background soil concentrations are used as part of the screening. The screening tables indicate if contaminant concentrations are above EBSLs but are below background concentrations, the contaminant is not retained for the next level of screening. The figure does not include the comparison to background concentrations. (JS)	A clarification will be made as suggested.

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DOCUMENT TITLE: EDF-ER-311, Screening Level Ecological Risk Assessment

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
41	Sec 5	76	This section presents the ICDF SLERA summary and results. The results are not presented in a manner specific to soil exposure from the landfill and water exposure from the evaporation ponds. The results simply identify the contaminants that did not screen out and could potentially reach concentration levels of concern for the ecological receptors.. <u>Suggestion</u>: The results would be more meaningful if the following were stated. The ecological risk characterization indicates that boron concentrations in landfill soil could potentially reach concentration levels of concern but ecological risk is not anticipated since soil exposure will be limited by a 2-ft clean fill layer maintained during facility operations and a biobarrier will be in place when the facility is completed. The ecological risk characterization indicates that combined exposure to arsenic in both the landfill soil and the evaporation ponds could potentially be of concern but ecological risk is not anticipated since soil exposure will be limited by a 2-ft clean fill layer maintained during facility operations and a biobarrier will be in place when the facility is completed. The risk characterization indicates that sulfate and vanadium concentrations in the evaporation ponds could potentially reach concentration levels of concern to ecological receptors. (JS)	The section has been changed to read as suggested.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-273, Permeable Reactive Barrier Decision Analysis

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
43**		3-1	This section states that the "ICDF landfill will be capped with a robust state-of-the practice cover to minimize long-term infiltration". However, if the permeable reactive barrier is in place prior to the capping of the landfill, it may aid in minimizing the infiltration during the active life of the landfill and reduce COPCs like I-129 in the Evap Pond.	Current analyses do not show a need for a PRB, either on the outside or inside of the landfill. If future analysis would indicate that there is a need to reduce COC concentrations, then the WAC would be limited to provide this reduction.
44**		4-1	There are reactive barrier materials, e.g., marine sediments, which will effectively retard I-129 movement into the leachate collection system	There are a number of natural materials that have been shown to interact with iodine ions and have some effect on relative mobility of the iodine. The application of these materials (e.g., marine sediments, andosol soils, etc.) as components of landfill liner systems, however, has not been demonstrated. It is not clear that these unique materials can, or will, react to reduce iodine mobility if they are removed from their native environments. A review of iodine interactions with andosols in Japan suggests that the iodine retention capacity is a complex function of physical, chemical, and biological interactions. There is not a sufficient body of scientific information that indicates that simply transplanting these unique materials from their origin into a landfill liner will provide retention of iodine.

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DOCUMENT TITLE: EDF-ER-273, Permeable Reactive Barrier Decision Analysis				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
85**	Title Page	i	The permeable reactive barrier (PRB) appears to be compared to the design life of the ICDF as 1,000 years. No discussion is offered about how long the PRB is anticipated to last and what short term benefits that a PRB can provide. The study objective is to determine if the remedial action objectives (RAOs) are in compliance with the design. An important and consistent assumption is that compliance occurs after installation of the cap. This assumption is a self fulfilling prophesy since the cap is suppose to achieve RAOs, but artificially moves the start time of zero out to 15 years at the time of cap placement thereby leaving the first years of landfill operation unprotected. The PRB has a primary purpose to neutralize chemistry of leachate prior to entering the SRPA, which essentially limits the required design life to say the first 20 years of landfill life (say 15 years open and 5 years of dewatering) with the cap to provide the protection after dewatering the landfill. Some discussion of the time line and the potential effectiveness of the PRB should be presented from time zero of the start of landfill operations. Alternatively, the PRB may be made more effective if it is constructed under the primary liner? (RH)	The lack of scientific information regarding performance of a PRB for constituents of concern at the ICDF prevents a quantitative evaluation of the longevity of any such feature. The ICDF design incorporates a multi-layered liner system of both natural (i.e., bentonite clay) and synthetic (e.g., HDPE membrane) materials that have demonstrated engineered and hydraulic characteristics. There is little uncertainty that the combination of HDPE membrane and compacted clay/soil liner will provide an impervious liner system during the operating and post-closure period. During this estimated 45-year period, leachate generated in the landfill will drain to the sump system where it will be pumped out to the evaporation pond(s). A permeable reactive barrier, if indeed one could be designed and constructed, would provide little apparent value added during the operations/post-closure periods.
86**	Abstract	iii	The logic presented in the PRB analysis gives the appearance that the choice is either a PRB or a 1,000 year landfill cap. The PRB analysis is to demonstrate if there is a protection to the Snake River Plain Aquifer (SRPA). (RH)	The objective of the ICDF liner and cover system design is to ensure that the groundwater remedial action objectives (RAOs) are met. Evaluation of the concept of the "permeable reactive barrier" does not provide a high level of confidence that such a feature (i.e., the PRB) could be either 1) constructed, or 2) expected to perform by reducing mobility of multiple constituents of concern with any level of confidence. The engineered structures incorporated into the ICDF design (e.g., multi-layered natural and synthetic liner system with a graded geologic surface cover) can provide a substantial level of confidence in their long-term performance based on existing information. Based on the need to demonstrate a high degree of confidence in the ability of the facility to meet the RAOs, the implementation of engineered structures (e.g., cover and liner) to provide leachate control is more desirable than the PRB, the materials and construction of which has not been successfully demonstrated for these constituents.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-273, Permeable Reactive Barrier Decision Analysis

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
87**	Sec 2, 1st para	2-1	It is unclear how the word "conservative" is being used to describe the contaminant mass within the landfill. Is the meaning such that the contaminant mass is being overestimated in the computations for analysis of the PRB, or is it that the contaminant mass is being underestimated? Either description should be further described and what impact this decision has on the final analysis. (RH)	The inventory of waste constituents is believed to be conservative in that the actual waste material disposed to the landfill is not expected to exceed the design inventory. The waste acceptance criteria (WAC) can be used for administrative control of waste to ensure that facility design requirements are met.
88	Sec 3.2, 2nd para	3-5	The discussion about Table 2 presents information about several chemical compounds that are expected to change in concentration over the landfill design life, but the discussion terminates prior to reaching a conclusion on how these compounds are to be addressed. (RH)	Waste acceptance criteria (WACs) will be established to ensure that RAOs for these constituents are not exceeded.
89	Sec 3.2, 1st bullet	3-7	The statement that most of the chemical constituents are anticipated to be below the remedial action objectives appears to indicate that dilution is the solution to not having a PRB. The purpose of the PRB analysis is to determine if there is a health and environmental benefit from installing a PRB. (RH)	See response to comment #43. Our opinion of the PRB is a last alternative to achieve compliance with the ROD RAOs. The preferred alternative is limiting the WAC as needed for certain constituents to comply with ROD RAOs.
90	Sec 3.2, 2nd bullet	3-7	This statement infers that waste will be treated prior to disposal to achieve chemical concentration limits? Is this the correct interpretation? (RH)	That is correct. Any waste that has concentrations exceeding WAC limits will require treatment at the SSSTF prior to disposal at the ICDF landfill.
91**	Sec 3.3, 2nd para	3-7	The infiltration rate is estimated at 1 cm/year for this analysis. Is this an adequate infiltration rate and how was the value derived? There has been information provided elsewhere in the 30% design about moisture addition to the landfill to control dusting and fugitive emissions. Therefore, the waste mass may be approaching field capacity for moisture addition when nature adds moisture. (RH)	For the cited simulation (i.e., loss of constituents from a hypothetical filled landfill without cover) the initial soil moisture condition was assumed to be at saturation. The subsequent loss of contaminants in the drainage of 1 cm/yr provided the net loss of about 10% of the most mobile constituents. The assumption of saturation as the initial moisture condition for this simulation should be conservative with respect to potential addition of water for dust control. In addition, the presence of the impervious HDPE liner component will provide interception of drainage during this period with subsequent removal of the leachate from the sump.
92	Sec 4.2	3-5	Some very significant operational and design assumptions were used to arrive at this conclusion. Those assumptions should be summarized for inclusion into the ICDF design. (RH)	Need definition regarding specific operational and design assumptions.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-312, Evaporation Pond Lining System Equivalency Analysis

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
45		2	The alternative design suggests 1-ft structural fill. Typically, an 18-inch fill is used in landfills. Please provide loading calculations to verify 1-ft of structural fill will be able to support the combined weight of the liners, landfill and heavy equipment. (JF)	The reviewer is correct for loads expected at the landfill. However, it should be noted that the equivalency analysis is only for the evaporation pond (EP) lining system. The EP lining system will not be subject to heavy equipment or waste filling loads. The only load of note on the EP lining system is the liquid in the pond. For a maximum depth of 7 feet the compressive load on the lining system is less than 500 psf. This would be considered a light loading condition and one that could easily be accommodated by 1-foot of structural fill.
46	Sec 2.2.2	9	Please remove the following sentence, "However, if one considers the operations layer as an integral component to the function ..." (and all other similar references). (JF)	Disagree – the point that is made in this section is that the standard lining system could not function effectively in the INEEL environment without the operations layer. Thus with respect to the ICDF the operations layer is an integral component of the standard lining system and it is appropriate to consider it when comparing to the alternative lining system with respect to construction and operation criteria.
47			Figures 1-1 and 2-1 are missing from the text. Please insert them. (AP)	Comment noted. Figures 1-1 and 2-1 were provided in separate .pdf files and need to be inserted into the text by technical editors.
48	Sec 2.2.1.1	8	This section states, "The rate of leakage through lining systems with geomembranes due to permeation is negligible compared to the rate of leakage through geomembrane defects (Giroud and Bonaparte 1989a)." Please indicate the rate of leaking associated with "negligible," and how the liner used in the study by Giroud and Bonaparte is essentially the same as the liner that would be manufactured for this project. (AP)	It should be noted that the leakage rates discussed in this section are for the purpose of comparing the standard and alternative lining systems and not to predict the actual leakage rate of the EP lining system. For comparison purposes the critical issue is that consistent parameters are applied to both the lining systems. a) The statement is taken (see p. 56, Section 2.3) from the Giroud and Bonaparte (1989a) paper which was provided as reference in Appendix B. G &B paper actually uses the terminology "very small" as opposed to negligible. To quantify this statement the paper summarizes leakage rates (for the case discussed in the paper) through geomembrane liners in Table 7. For 1 ft head on liner the leakage rate through permeation is 0.1 gpad compared to 100 gpad for small holes in the liner and 3,000 gpad for large holes. For a case with 10 ft head on liner the leakage rate through permeation is 10 gpad compared to 300 gpad for small holes in the liner and 10,000 gpad for large holes. So for the case of geomembrane liner only it is an reasonable conclusion. However for composite liner systems where the leakage rate through defects is drastically reduced, the leakage through the lining system due to permeation is no longer considered negligible.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-312, Evaporation Pond Lining System Equivalency Analysis

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
48 (cont.)				Thus if one were to determine the actual leakage rate through a composite lining system the permeation component should be considered. It should be noted that although not considered as part of the equivalency analysis the permeation leakage rate component would be the same for the standard and alternative lining system as the geomembrane liners are the same in both systems. b) Giroud and Bonaparte evaluated liners manufactured of all the commonly accepted materials including HDPE (which is the lining material for the EP lining system). Table 3 in the 1989a paper provides a summary of the lining materials evaluated and calculates an equivalent hydraulic conductivity (k) for each. Note that HDPE has one the lowest equivalent k values. As for the evaluation of leakage rates through defects, the equations developed by G & B are based on fluid dynamic principles and independent of the lining material type.
93	Sec 2, 4th para	5	The principal design issues are enumerated in this section. Logic indicates that wind uplift of the sacrificial liner is a concern at the end of the pond life when the pond liner is dry, but contains radioactive sediment that could be discharged into the atmosphere due to wind uplift. (RH)	Wind uplift of the sacrificial liner should not be a concern during the operation of the evaporation pond (EP) as the open edges of the liner will be sealed in the anchor trench. As long as the open edges are sealed at the anchor trench and not rips or tears exist in the liner there is no pathway available to uplift the lining system. At the end of the pond life the removal or covering of the sacrificial liner should be performed in a manner that prevents uplift of the liner and discharge of dry sediment to the atmosphere. This should be addressed in the closure plan for the evaporation pond.
94	Sec 2.2.1, 1st para	6	Typo: The drawing is correctly entitled Slope Stability Assessments, not "Slop". (RH)	Comment incorporated. Note that reference as shown is not correct and needs to be revised to "ICDF – Drawings" (DOE-ID, 2001a).

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DOCUMENT TITLE: EDF-ER-312, Evaporation Pond Lining System Equivalency Analysis

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
95	Sec 3, last para	18	Water is the liquid component for the GCL flux analysis, but the conclusion reached is for the hazardous constituents. It appears reasonable to evaluate the GCL performance of the pond liner based upon water. Is there a chemical limitation for solvents in which the performance of the GCL begins to decrease, or becomes unacceptable as a substitute for clay? (RH)	We are unaware of general chemical limitation on GCLs when exposed to solvents. Prof. Dave Daniel provided the following information on the topic at a recent short course on GCLs for Waste Containment: • Dilute organic compounds are of little of no concern. Dilute is defined has less than 50% chemical in solution. *Typical leachate concentrations are much more dilute than 50%.* • Chemical effect is more severe when first wetting liquid is leachate or chemical – bentonite is more chemically resistant if hydrated in fresh water before chemical exposure. *The GCL as shown in the EP lining system is likely to become hydrated form either condensation within the lining system or from underlying soil layers, prior to chemical exposure.* • Chemical attack on GCLs is more pronounced at low compressive stresses – at high compressive stress there is likely to be little or no harmful effect from any chemical exposure. *The EP lining system would be considered under a mid-range compressive stress under a water depth of 4 to 7 feet.* Additionally, as part of our work for the 90% RD/RA Work Plan the compatibility of the lining system components was evaluated and reported in EDF-278 (Liner/Leachate Compatibility Study). The compatibility study concluded the following: "The GCL manufacturer allows the use of GCL with few restrictions on maximum chemical concentrations. The manufacturer does recommend that treated bentonite should be used when directly exposed to liquids with high concentration of salts (divalent cations) such as in seawater (CETCO). The concentration of salts in typical seawater is on the order of 35,000 mg/l. The ICDF total inorganic leachate concentration is on the order of 5,000 mg/l much lower than that of seawater. The bentonite added to the clay soil for the compacted clay liner will have the same limitation, however, to a lesser extend since only a small percentage (i.e., 5 percent) is comprised of bentonite. Based on this assessment, the exposed salts in the brackish leachate will be compatible with the GCL and soil bentonite liner underlying the geomembrane."

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ICDF 60% DESIGN PACKAGE[a]
DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10851, ICDF Construction Quality Assurance Plan				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
49	Sec 5		It should be stated in the QA plan that prior to gravel placement, the CQA monitor and field inspectors will verify and document that the gravel is of the round type as to not tear the liner above or below it. (JF)	The CQA plan will include these requirements for inspecting the gravel prior to placement.
96**	Sec 2.1.2.10	I-6	The intent of the CQA monitor is to perform as an independent third party observer. The CQA monitor should not have authority to *direct the activities of the field inspection team and laboratory technicians* unless these are also employees of the CQA monitor. The CQA monitor should certainly educate the field and laboratory technicians on the CQA requirements and procedures, but direction should only come from the CQ Engineer that is assumed from Figure 2-1 that the field inspection team and technicians report to the engineer. (WF)	The CQA plan will be revised in the 90% submittal to reflect this organization structure.
97**	Sec 2.1.2.11	I-6	The CQA certifying officer should be given the authority to recommend a work stoppage and possible remedial actions to the Regulating Agencies. Figure 2-1 should be corrected to show the CQA certifying agent is responsible to the Regulatory Agencies, not the Procurement Agent. This would ensure that the CQA certifying officer is an independent, third-party team member. (WF)	The regulatory agencies are currently being provided the weekly CQA reports. The CQA certifying officer can issue a nonconformance report to BBWI indicating a sever work deficiency that requires work stoppage. There are also hold points in the construction (i.e., after the soil bentonite liner placement) that requires certification from the CQA certifying officer prior to proceeding with the subsequent layer. The CQA certifying officer as been retained by BBWI to provide certification of the ICDF construction independent of the subcontractor.
98	Sec 2.2	I-6	A particular team member should be designated as responsible for coordinating each type of meeting. At a minimum, the coordination tasks should include preparing an agenda, notifying the appropriate project personnel that should attend a particular meeting, and insuring that minutes are taken and dispersed appropriately. (WF)	The agenda and appropriate project personnel are described in the CQA plan for each type of meeting. Meeting minutes are recorded for the bi-weekly progress meetings. Meeting minutes of each daily meeting is recorded in the Subcontractors field books. Meeting minutes in another format would be difficult since this meeting is held outside adjacent to the construction area.
99	Sec 2.2.2	I-8	The meeting should not be documented in the field books. The meeting minutes should be kept in a separate project job file and distributed to a designated list. Field books should only include observations made in the field. (WF)	See response to comment number 98.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10851, ICDF Construction Quality Assurance Plan

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
100**	Sec 3.5	I-11	The geosynthetic laboratory shall have GRI certifications for the test methods to be performed. (RH)	Agree. Will change text in the revised 60% deliverable to incorporate this requirement.
101**	Sec 3.1	II-4	To minimize systematic errors with the rapid water content (ASTM D3017) and total density (ASTM D2922) measurements, at least the first 10 test values should be cross checked against conventional methods. The rapid water contents should be compared to oven moisture contents (ASTM D2216), and the rapid total densities should be compared to densities determined by either the sand cone (ASTM D1556) or rubber balloon (ASTM D2167) methods. Graphs that plot the rapid test values against the conventional test values should be prepared, and a correction value should be determined by the CQA Monitor. As the construction process continues, one in every 10 rapid water contents and one in every 20 rapid total densities should be cross checked against conventional methods. <u>Suggestion</u>: These additional measurements should be added to the original cross check graphs, and the CQA Monitor should determine if the correction values should be modified based on the additional test values. The test frequency intervals for the conventional testing are included in the EPA technical guidance document (EPA/600/R-93/182 QA and QC Control for Waste Containment Facilities, September 1993). (WF)	We agree that the rapid densities and moisture contents should be crosschecked against conventional methods. We also agree oven moisture contents are repeatable and provide a good crosscheck for the rapid tests. Based on our experience on other projects, densities determined suing sand cones or rubber balloon methods are sometimes less repeatable than the total densities determined by the nuclear density gauge. Therefore, they do not provide a good cross-reference. We suggest using a calibration block or concrete block to verify that the nuclear density gage is functioning properly.
102	Sec 4.2.1.1	II-8	The base soil should be tested for water content. This test value is particularly important because the process of mixing bentonite with the base soil will be more effective at water contents that are dry of optimum water content, and less effective at water contents wet of the optimum water content. The same frequency specified in Table II-3 for the post compaction of the CCL should be used. (WF)	We agree that mixing bentonite with soil that is dry is more effective than mixing it with wet soil. Text will be included in the specifications and CQA plan that allows mixing benonite in base soil during no precipitation periods and base soil that is dry (i.e., natural moisture content).

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10851, ICDF Construction Quality Assurance Plan

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
103**	Sec 4.2.2	II-9	The same procedure discussed for minimizing the systematic errors with the rapid water content and total density of the subgrade should be used for the CCL. The initial measurements could be obtained as part of the test pad construction. (WF)	See response to comment number 101.
104**	Table II-2	II-16	Minimum frequency of testing for CQA evaluation of prepared subgrade. Both of the conventional test methods for total density, the sand cone and rubber balloon methods, should be included at a frequency of one for every 20 rapid tests. It should be noted that the gauge calibration method described in ASTM D2922 includes using several large reference blocks that vary in density over the range representative of the density of the materials to be tested. The blocks should have minimum dimensions of 24" X 17" X 12", and are typically made from aluminum, magnesium, aluminum/magnesium, granite, and limestone. The reference blocks are not commonly used in the building construction industry. For the ICDF facility, the CQA Plan should clearly list this additional requirement to prevent its oversight. (WF)	See response to comment number 101.
105	Table II-2	II-16	Minimum frequency of testing for CQA evaluation of prepared subgrade. The oven water content testing frequency should be revised to one for every 10 rapid tests. (WF)	See response to comment number 101.
106**	Table II-3	II-17	Minimum frequency of testing for CQA evaluation of clay liner. The base soil should be tested for water content during preprocessing at the frequency of 5 per acre or a minimum of 1 per day. (WF)	See response to comment number 102.
107	Table II-3	II-17	Minimum frequency of testing for CQA evaluation of clay liner. Curing should be defined in a note below the table. (WF)	The CQA plan will indicate that curing should be performed in accordance with the Technical Specifications. The Technical Specifications indicate a minimum curing time of 12 hours.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10851, ICDF Construction Quality Assurance Plan

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
108**	Table II-3	II-17	Minimum frequency of testing for CQA evaluation of clay liner. Both of the conventional test methods for total density, the sand cone and rubber balloon methods, should be included at a frequency of one for every 20 rapid tests. The drive cylinder method, ASTM D2937, should also be considered for cross checking the rapid test method. (WF)	See response to comment number 101.
109	Table II-3	II-17	Minimum frequency of testing for CQA evaluation of clay liner. The number of passes and the definition of what constitutes a pass should be defined in a note below the table. (WF)	A pass is defined as forward and back. It will be noted in the CQA Plan.
110	Table II-5	II-18	Minimum frequency of testing for CQA evaluation of gravel. State the maximum carbonate content that allows the reduced testing frequency. (WF)	The maximum carbonate content that allows the reduced testing frequency will be included in the CQA plan and Technical Specifications.
111**	Sec 1.4	III-1	Add bentonite mass per unit area test, ASTM D5993, and the swell index test, ASTM D5890, to the list of conformance tests. These two tests are recommended in the EPA technical guidance document (EPA/600/R-93/182 QA and QC Control for Waste Containment Facilities, September 1993). (WF)	This will be added to the revised 60% CQA Plan.
112	Sec 1.4	III-1	Manufacturers will not provide a minimum value for grab strength for a fabricated roll of GCL. They will only provide values for the geotextile or geomembrane before they are fabricated into the GCL. Therefore the grab strength test, ASTM D4632, does not provide a useful test value for the GCL delivered to the site, and should be deleted as a QA requirement. (WF)	Agreed. Comment will be incorporated.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10851, ICDF Construction Quality Assurance Plan

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
113	Sec 1.4	III-1	The permeability test, ASTM D5084, is very difficult to perform for a GCL and impractical when the GCL includes a geomembrane. The geomembrane will lower the overall permeability of the GCL by at least four orders of magnitude, thereby masking the permeability of the bentonite component of the GCL. The test is difficult to perform when the GCL includes a geotextile because of the imprecision of measuring the thickness of the GCL inside of the triaxial cell. The thickness is a parameter in the permeability calculation. This difficulty is the reason that manufacturers prefer measuring flux, ASTM D5887, which does not use thickness as a test parameter. Therefore, the acceptable QA test should be ASTM D5887 with ASTM D5084 being deleted. (WF)	Agreed. Comment will be incorporated.
114	Sec 1.4	III-1	The interface shear strength test, ASTM D5321, is more a design value test and not a practical conformance test. The test should be performed during design to confirm the design assumptions, not during construction as a conformance test. If requested as a conformance test, a list of test conditions should be included. Among the most important are the range of normal stresses, the speed of displacement, whether the GCL should be immersed in water, and the adjacent liner components that the GCL should be sheared against. Performed properly, the significant problem with this test to document conformance is the minimum one week turnaround time that a laboratory will typically require to perform the test. This test should be deleted. No substitute test is available to measure conformance. (WF)	Agreed. Comment will be incorporated.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-290, NESHAP Modeling for ICDF Complex				
Item	**Section/ Figure/ Appendix**	**Page**	**Comment**	**Resolution**
50	Table 7		Although "a" represents a value that is already accounted for in the landfill calculations, a footnote should be added to explain this to the reader. (JF)	Add the following footnote to Table 7. " a. Gaseous radionuclides are assumed to be all released at the landfill, hence, there would not be any remaining in the leachate."
51**		25	The maximum exposed individual (MEI) for the NESHAP modeling was assumed to be at the site boundary. However, the modeling should include scenarios for on site non-DOE workers to address short-term risk concerns. (JF)	On Site dose will be addressed in the EDF-327, "Landfill Risk Assessment for Workers."
115	Sec 2	2	The last bullet under landfill details the assumed density of the soil to be 95 pounds per cubic foot per the stated reference. Is this density value for the landfilled waste material rather than soil? (RH)	Replace the statement with "The assumed density of the landfill waste soil is 95 lb/ft^3 (Perry's Chemical Engineers' Handbook)."

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: EDF-ER-322, Waste Placement Mapping Strategy

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
52**		2	Section 1.2.2 states that a grid system of 50-ft by 50-ft with a maximum of 5-ft layers will be used at the landfill. A grid spacing of 25ft x 25ft x 5 ft is more appropriate for waste tracking purposes and ARAR compliance. <u>Suggestion</u>: Please discuss exactly how these grids will be established (i.e., will the points be surveyed in, paced off, or marked off using measuring wheel, etc.). Also include the frequency at which the grids will be marked off and who will be preforming this task. (JF)	A 50 x 50 x 5-ft grid spacing was agreed upon with the Agencies during the 30% design review. This spacing is adequate for the intended purposes.
116	Sec 1.2.3	2	The recommendation for the visual use of a grid system is acceptable, but frequently has difficulties with the vertical component. The visual method should be supplemented with either GPS or survey method at least monthly. (RH)	Agree. Periodic surveying or GPS methods may be performed to ensure accurate elevations.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10866, Waste Acceptance Criteria for ICDF Evaporation Pond

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
70	Sec 1.2	1-2	The OU 3-13 ROD identifies the purpose of the ICDF Evaporation Pond, "... for purpose of managing ICDF leachate and other aqueous wastes generated as a result of operating the ICDF complex." It does not state, "...generated in the ICDF complex..." Part of the ICDF complex is the SSSTF whose purpose is to manage INEEL CERCLA wastes. It should be clarified that the evaporation pond may be used to treat WAC acceptable aqueous waste streams sent to the SSSTF.	Text will clarify purpose of evaporation pond in accordance with comment.
71	Sec 1.2.1, 2nd bullet	1-3	Regarding the last sentence describing that, "All of the waste in the current design basis inventory can be accepted ... without treatment." The last two words do not fit with the section heading describing waste volumes and appears to be a way to gain regulatory approval to dispose liquid waste into the ICDF ponds. The purpose of the document is to establish criteria for disposal. (RH)	The text will be revised to eliminate the reference to treatment in this section of the WAC.

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DOCUMENT TITLE: DOE/ID-10866, Waste Acceptance Criteria for ICDF Evaporation Pond

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
72**	Sec 1.4.2, 4th bullet	1-6	The evaporation pond has different design requirements from the ICDF liner system. The logic that 60 mil HDPE is acceptable for the landfill liner does not automatically extend to the pond. The design of the landfill liner has assumed that the HDPE liner does not provide a benefit during the liner system evaluations during the design life of the facility. The pond is designed to be continuously flooded and the leachate characteristics will be different from the landfill. Evaporation of the pond liquids may concentrate the chemical makeup of the leachate, and addition of liquid waste may dilute those chemical characteristics. The pond liner is also subject to wind, thermal, and UV forces in addition to the additional chemistry and constant contact with radio nuclides. A question raised during the previous 30% design meeting about the resistance of HDPE polymer to radioactive degradation of the polymer chain has not been answered for the landfill liner and more importantly to the integrity of the pond liner, considering the forces to be resisted. An EPA Method 9090 test is appropriate to provide a demonstration of leachate compatibility, if there can be agreement about the chemical characteristics of the leachate the pond might be subjected to. (RH)	Comment will be addressed as part of the 90% submittal.
73**	Table 2-1	2-1	All ICDF leachate is acceptable only if an approved WAC with agency acceptance of waste profile through approval of the WAC. Any new waste profiles need to be pre-approved by the agencies as a modification of a primary document, i.e., the O&M plan. Also, agencies' oversight on the leachate chemistry delivered to the evaporation pond, should be based upon the EPA Method 9090 testing results.	The waste stream approval process was described during the week of November 12th. This approval process will be included in the SSSTF RD/RA Work Plan.
74	Table 2-1	2-1	Since the pond liquid is constantly changing, the quantity and composition of the liquid waste being discharged into the evaporation pond should be monitored and managed to maintain a chemical condition below WAC threshold. <u>Suggestion</u>: Monitoring can be established from the EPA Method 9090 testing for the pond liner. (RH)	Leachate monitoring of the evaporation ponds will be performed as part of operation and maintenance activities for the ICDF.

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DOCUMENT REVIEW, COMMENT, RESOLUTION LIST - EPA

DOCUMENT TITLE: DOE/ID-10866, Waste Acceptance Criteria for ICDF Evaporation Pond

Item	Section/ Figure/ Appendix	Page	Comment	Resolution
75**	Sec 3.5.1	3-3	Waste profile sheets of the ICDF leachate and also the evaporation pond should be prepared to manage the chemical condition of the pond liquid below some threshold established from the EPA Method 9090 testing for the pond liner. (RH)	The WAC for the evaporation pond that will be submitted as part of the RD/RA Work Plan/Title 2 Design will include limitations based on historical EPA 9090 testing from other DOE sites. The ICDF leachate has been analyzed based on anticipated leachate characteristics any interactions between the evaporation pond and the landfill have been included in the WAC for the landfill. Therefore, waste profile sheets for the ICDF leachate should not be necessary.
76	Table 4-1	4-1	See previous discussion for §1.4.2, 4th bullet regarding the issue about pond liner acceptance based upon landfill liner acceptability. (RH)	We agree that landfill liner acceptability must be included as one of the requirements of this WAC. The landfill liner acceptability will be provided with the draft RD/RA Work Plan/Title II design.
77	Sec 4.1.3	4-2	The conclusions of this section rely on information provided in Appendix A. The documentation of Appendix A, is scheduled for presentation in the 90% submittal and therefore was not evaluated at this time. (RH)	Agree. This information will be provided in the draft RD/RA Work Plan/Title II design deliverable.
78**	Sec 4.1.4.2	4-3	ARAR requirements are for the liner to be constructed of materials to be resistant to the wastes that will be managed in the impoundment. This requirement has not been clearly demonstrated given the changing nature of the chemistry of the liquid within the ICDF evaporation pond. (RH)	This requirement will be demonstrated in the liner compatibility study in the Draft RD/RA Work Plan/Title II Design.
79**	Sec 4.2	4-4	The analysis for worker risk is incomplete for reasons stated in the text. Consideration of the concentration of pond liquid chemistry due to liquid evaporation is necessary when completing the analysis for worker risk. (RH)	The worker risk will be further defined in EDF-ER-327 which will be provided as part of the draft RD/RA Work Plan/Title II Design deliverable.

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